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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-------------------------|---------------------|------------------|
| 10/538,923 | 06/13/2005 | Frederic Nguyen Van Dau | 4590-421 | 9522 |
| 33308 | 7590 | 10/23/2006 | EXAMINER | |
| LOWE HAUPTMAN GILMAN & BERNER, LLP 1700 DIAGNOSTIC ROAD, SUITE 300 ALEXANDRIA, VA 22314 | | | LIU, BENJAMIN T | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2826 | |

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|--------------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/538,923 | NGUYEN VAN DAU, FREDERIC | |
| | Examiner | Art Unit | |
| | Benjamin T. Liu | 2826 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

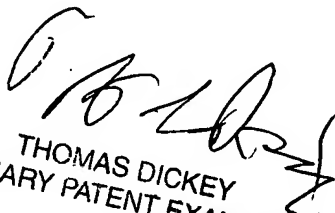
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.


THOMAS DICKEY
 PRIMARY PATENT EXAMINER

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. Claim 7-9 recites the limitation "each electrical connection" connected to the emitter, base, and collector. There is insufficient antecedent basis for this limitation in the claim.

Claim Objections

3. Claim 7 objected to because of the following informalities: Regarding claim 7, "emitter base and collector layers" should be changed to --emitter, base, and collector layers--. Appropriate correction is required.

Allowable Subject Matter

4. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 8, prior art does not disclose the electrical voltage applied between the emitter and the base via the connection means and is greater than the potential barrier of the insulating layer, wherein a collector current is the sum and a

tunnel current between the base and the collector means and the ballistic current from the emitter and the collector current has sufficient energy to pass through the base and the Schottky diode without relaxing.

Claim Rejections - 35 USC § 102(b)

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 and 4-5 are rejected under 35 U.S.C 102(b) as being anticipated by Mizushima et al. (5,747,859).

With regard to claim 1, figure 5 of Mizushima et al. discloses a spin-valve transistor comprising: an emitter 31, a base 23, and a collector 12, wherein the emitter 31 being made of a semiconductor material, the base 23 comprising three successive metal layers, the first layer 21a and the third layer 21b being ferromagnetic, the second layer 22 not being ferromagnetic, the interface between the emitter 31 and the layers of the base 23 forming a Schottky diode, wherein the collector 12 is metallic and separated from the base by a thin insulating layer 11 of approximately a few nanometers, the layer 11 forming a tunnel-effect barrier between the base 23 and the collector 12.

The applicant's claim 1 does not distinguish over the Mizushima et al. reference regardless of the functions allegedly performed by the claimed device, because only the device per se is relevant, not the recited function of the semiconductor layer emitting electrons and the metal layer collecting electrons.

Note that functional language in a device claim is directed to the device per se, no matter which of the device's functions is referred to in the claim. See *In re Ludtke and*

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Sloan, 169 USPQ 563 at 567, and *In re Swinehart*, 169 USPQ 226, both of which make it clear that it is the patentability of the device per se which must be determined in a "functional language" claim and not the patentability of the function, and that an old or obvious device alleged to perform a new function is not patentable as a device, whether claimed in "functional language" terms or not. Note that the above caselaw makes clear that in such cases applicant has the burden of showing that a prior art device that appears reasonably capable of performing the allegedly novel function is in fact incapable of doing so. See MPEP § 2114. See also *In re Schreiber*, 44 USPQ2d 1429, 1432 (Fed. Cir. 1997) (Claim to a spout having "taper ... such as to by itself jam up the popped popcorn before the end of the cone and permit the dispensing of only a few kernels at a shake," anticipated by an oil can spout having the same shape as spout Applicant disclosed as being adapted for dispensing said only a few kernels) and *In re King*, 231 USPQ 136 (Fed. Cir. 1986) ("It did not suffice merely to assert that [the cited prior art] does not inherently achieve [the claimed function], challenging the PTO to prove the contrary by experiment or otherwise. The PTO is not equipped to perform such tasks") for discussions of the roles of examiner and applicant in determining when and how functional limitations distinguish a claim from prior art disclosing the same structure.

In this case it is reasonable to assume that Mizushima's metal region 12 is capable of functioning as applicant's collector and Mizushima's semiconductor layer 31 is capable of functioning as applicant's emitter because the structures are both the same and should function similarly.

Because it is reasonable to assume that Mizushima's device is capable of performing the claimed function, the burden shifts to Applicants to show that it are not. See MPEP § 2114.

With regard to claim 2, figure 5 of Mizushima et al. discloses the insulating layer 11 presents a lower-level potential barrier than the potential barrier of the Schottky diode existing between the emitter 31 and the base 23.

With regard to claim 4, figure 5 of Mizushima et al. discloses the insulating layer has a thickness of 1.5 nanometers, which is approximately between 1 and 4 nanometers. (Note lines 42-43 in column 9 of Mizushima et al.)

With regard to claim 5, figure 5 of Mizushima et al. discloses the emitter 31 comprises at least one layer of semiconductor material and the collector 12 at least a first layer of metallic material.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C 103(a) as being unpatentable over Mizushima et al. (5,747,859) in view of Frank (4,575,741).

With regard to claim 3, Mizushima et al. discloses all the subject matter claimed except for the insulating layer made of tantalum oxide or zinc sulfide or zirconium oxide or a rare earth oxide such as yttrium oxide.

However, figure 1 of Frank discloses the insulating layer 5 is made of tantalum oxide, which is one of tantalum oxide or zinc sulfide or zirconium oxide or a rare earth oxide such as yttrium oxide. (Note line 35 in column 1 of Frank)

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Mizushima et al. with the insulating layer of Frank in order to provide a low-level tunnel barrier.

Claim 6 is rejected under 35 U.S.C 103(a) as being unpatentable over Mizushima et al. (5,747,859) in view of Kroger et al. (3,979,613).

With regard to claim 6, Mizushima et al. discloses all the subject matter claimed except for the layer of semiconductor material of the emitter comprises at least a second layer of metallic material.

However, figure 16 of Kroger et al. discloses the layer of semiconductor material of the emitter 53 comprises at least a second layer of metallic material 54.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Mizushima et al. with the metallic material of Kroger et al. in order to provide an electrical contact to the emitter layer.

Claims 7 and 9 are rejected under 35 U.S.C 103(a) as being unpatentable over Mizushima et al. (5,747,859) in view of Taylor (2002/0121647).

With regard to claim 7, Mizushima et al. discloses all the subject matter claimed except for each electrical connection means is connected to the emitter base and collector layers and are placed on top on the level of the first layer of metallic material, on the level of the second layer of metallic material and of any one of the layers of the base, the connection means being used to apply external voltages and currents to the transistor.

However, figure 2a of Taylor discloses an electrical connection 168 means connected to the emitter 164 base 163c and collector layers 159 and are placed on top on the level of the first layer 164 of metallic material, on the level of the second layer 172 of metallic material and of any one of the layers of the base 169, the connection means being used to apply external voltages and currents to the transistor.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Mizushima et al. with the structure of Taylor in order to provide access to each of the emitter, base, and collector layers.

With regard to claim 9, Mizushima et al. discloses all the subject matter claimed except for each electrical connection means is connected to the emitter base and collector layers and are placed on top on the level of the first layer of metallic material, on the level of the second layer of metallic material and of any one of the layers of the base, the connection means being used to apply external voltages and currents to the transistor.

However, figure 2a of Taylor discloses an electrical connection 168 means connected to the emitter 164 base 163c and collector layers 159 and are placed on top on the level of the first layer 164 of metallic material, on the level of the second layer 172 of metallic material and of any one of the layers of the base 169, the connection means being used to apply external voltages and currents to the transistor.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Mizushima et al. with the structure of Taylor in order to provide access to each of the emitter, base, and collector layers.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin T. Liu whose telephone number is (571) 272-6009. The examiner can normally be reached on Mon-Fri 9:30 AM-6:00AM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BTL
10/14/2006